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(54) Title: AUTOMATIC PROGRAM SELECTOR

TOP 20

FRONT & TOP
VIEW OF TABLET

(57) Abstract

An automatic program selector for controlling remote appliances has control responders including a control tablet (20) which employs a viewscreen to display a variety of words and images, and a pointing pen (30) to activate a point-screen (64) which overlays the viewscreen (62) and is coincident with same. By using the control tablet (20) a user may select from numerous pictorial, graphic, and alphanumeric displays, a function a user wishes the appliance to perform. Useful with entertainment appliances, the control can activate command sequences which are readily initiated by the simple act of selecting with the pointing pen (30) a desired program from a guide displayed on the viewscreen. The control tablet (20) alone or in combination with a responding holder (100), automatically issues the correct commands, including channel conversions, for example, to direct appliances to the selected program, or to record programs at a desired time in the future.

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Patent Application Of

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for

Automatic Program Selector

Background -- Field of Invention

This invention relates to the remote control of appliances, particularly to a remote control device for sophisticated entertainment and other appliances.

Background -- Description of Prior Art

Numerous types of remote devices exist for controlling appliances. Hand-held remote control (RC) devices are a particularly popular means for controlling entertainment appliances such as televisions, video-cassette recorders, satellite channel selectors, and the like. The number of command options for each appliance has grown, as has also the variety of appliances which can be remotely controlled.

Certain features are relatively easy to operate using one or more pushbuttons on the face of prior-art RC devices. For example, users find it simple and obvious to adjust audio volume with a RC device having two pushbuttons with respective arrow symbols for UP and DOWN. However, difficulties arise when many different commands are possible since these must be abbreviated. These difficulties are multiplied when a plurality of appliances

must be remotely controlled. Nonetheless, RC devices have become increasingly popular.

Recording machines such as VCRs, now make it possible to save audio or video broadcast programs for viewing at more convenient times. While RC devices can be used to program these machines to select a future time and channel, difficulties arise because the many steps required confuse the average user, so this valuable feature often goes unused.

Similar problems are common with other household appliance controls, such as microwave ovens. One must memorize a code, or abbreviation, or sequence of programming steps. Perhaps the most limiting aspect of all these controls is their reliance on fixed-designation pushbuttons. Any appliance with new command options would require a new control with a different set of pushbuttons. Alternatively, if the pushbuttons have multiple designations, the choice may not be obvious so that the user has to remember which function is assigned to which button. It is for these reasons that the user may acquire several hand-held devices to control several appliances.

A hand-held RC device operable for controlling a plurality of machines is described in patent 4,566,034 to Harger, 1986 Jan 21. While Harger's provides an improved device for controlling the few pieces of equipment for which it is designed, it is again limited to the fixed functions designated on its respective pushbuttons.

Other RC devices are available which have a viewing screen for indicating choices available. However the viewing screen provides a severely limited choice of options, usually for but a single set of commands for a single appliance. Some devices may be available that can be programmed with coded information, but the program choices must be derived from a fixed source whose versatility is severely limited.

Objects and Advantages

Accordingly several objects and advantages of the present invention are to provide an RC device that can issue many different commands, yet which is very easy to use, which can control multiple appliances, especially TVs, VCRs and the like, which can easily be used to record multiple programs at future times and dates, which does not use fixed-designation pushbuttons, which does not require the memorization of codes, which can use a single device to replace multiple devices, which can be used for controlling complex functions, which can be used to provide an extensive wide variety of choices on its own screen, and which can provide its own set of program choices.

Further objects and advantages are: to provide an RC device with a screen that can be dynamically altered to display all of the controllable functions and status information for an appliance, along with program guide information available for the appliance, to provide a method of controlling the appliance from the RC device, to provide a method of selecting program guide and device control information displayed on the RC device for the appliance, to provide a method for the RC device to receive and store program guide and status information for the appliance, to provide a method of storing in the RC device, program selection information for future viewing and recording on the appliance, to provide a method by which the RC device will allow a user to control similar appliances from different manufacturers in the same way, and to provide a method for controlling a multitude of appliances, with the same RC device, in the manner just discussed.

Further objects and advantages will become apparent from a consideration of the accompanying drawings and ensuing description.

Drawing Figures

Fig 1 is a view of the front and top of an RC device according to the invention.

Fig 2a is a view of the underside of the RC device of Fig 1.

Fig 2b is a view of the back of the RC device of Fig 1.

Fig 3 is a view of the front and top of a holder for the RC device of Fig 1.

Fig 4 shows an exploded view of the viewscreen and conductive pointscreen membrane of the RC device of Fig 1.

Fig 5 is a pictorial representation of a typical spread-sheet style television program guide displayed on screen of RC device of Fig 1.

Fig 6 is a representation of an exemplary select appliance mode menu screen.

Fig 7 is a representation of a exemplary compact disk mode selection screen.

Fig 8 is a block diagram of circuitry of RC device of Fig 1.

Fig 9 is a block diagram of circuitry of holder of Fig 3.

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Fig 10 shows a typical video appliance configuration where the program guide information is read by the holder of Fig 3, through an external medium.

Fig 11 shows a typical video appliance configuration where the program guide information is downloaded from a cable decoder into the holder of Fig 3.

Fig 12 shows an alternate embodiment wherein the television appliance is used to display the viewscreen.

Fig 13 is a flowchart listing of the program loop for the RC device of Fig 1.

Fig 14 is a flowchart of the interrupt background program running in the RC device of Fig 1.

Fig 15 is a flowchart listing of the program running in the holder of Fig 3.

Fig 16 is a modified version of the holder in Fig 3. further including a channel selector for the television system.

Drawing Reference Numerals

12 aperture formed in mating edges of parts 24 and 26 for emitter 52

14 aperture formed in mating edges of parts 24 and 26 for receptor 54

18 notch in edge of part 24 for securing strain relief 28

20 control tablet

22 support frame for control tablet 20

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24 housing top part of control tablet 20

26 housing bottom part of control tablet 20

28 strain relief for attachment cord 32

30 pointing pen for indicating selections on screen 62

32 attachment cord for pointing pen 30

34 penholder for pointing pen 30

36 pressure sensitive switch on tip of pointing pen 30

38 electric contact on tip of pen 30 for position sensing on conductive screen membrane 64

39 cursor for displaying position of pen tip on view screen

40 access cover for battery compartment 48

42 positive electrical contact

44 negative electrical contact

48 battery compartment

50 batteries

52 emitter

54 receptor

60 circuit board

62 screen for viewing selections

64 transparent, electric conductive membrane that adheres over screen 62

100 holder for control tablet 20

112 aperture formed in edges of parts 124 and 126 for emitter 152

114 aperture formed in edges of parts 124 and 126 for receptor 154

118 notch for securing strain relief 134

120 joystick with pushbuttons

122 support frame for holder 100

124 housing top part for holder 100

126 housing bottom part for holder 100

128 access slot for inserting lasercard 172 into reader 170

130 line power AC adapter

132 line power cord

138 strain relief for cord 132

142 positive electrical contact from power supply 148

144 negative electrical contact from power supply 148

148 power supply

152 emitter

154 receptor

160 circuit board

170 lasercard reader

172 lasercard

180 control tablet memory

182 control tablet controller circuitry

184 control tablet screen driver circuitry

186 control tablet pen position sensors circuitry

188 control tablet receptor detection circuitry

190 control tablet emitter driver circuitry

192 control tablet pen depressed switch detection circuitry

200 holder controller circuitry

202 holder memory

206 holder receptor detection circuitry

208 holder emitter driver circuitry

210 video cable/satellite/antenna channel selector

212 video recorder

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214 TV set

216 video cable connector - input

218 video cable connector - output

220 selected channel indicator

Control Tablet — Figs 1, 2A, and 2B

Fig 1 shows an RC device in accordance with the invention. Device 20 will hereafter be

referred to as a control tablet because it looks like a tablet which occupies a space roughly

equal to that of a small open book and would normally be oriented as shown, much like a

book laid open on a table. Tablet 20 contains a viewing screen 62 for displaying data.

Mounted directly above and over the surface of the viewing screen is a transparent, electri-

cally conductive pointing screen 64, shown in detail in Fig 4. This pointing screen is used

with a pointing pen 30 (Fig 1). Both screens are rectangular in shape and of the same size,

approximately 21 cm x 33 cm. Both screens are surrounded by a framed area of a top part

24 of the housing of tablet 20. Pointing pen 30 is shown in a penholder 34, which is a clasp

in the rear of top part 24 of the housing. The pen has also a durable and flexible attach-

ment cord 32 containing conductors.

As shown in Fig 2A, the underside or bottom 26 of tablet 20 has electrical contacts 42 and

44. These align and mate with similar contacts 142 and 144 of a holder 100, shown in Fig

3. An access cover 40 is also incorporated in bottom part 26. A support frame, a circuit

board with circuits, all necessary fasteners and circuit interconnections, which are not

shown, but are well known to those skilled in the art, are contained within the the RC

device.

Mounted inside tablet 20 are an infrared (IR) emitter 52 (Fig 2B) and an IR receptor 54. These are partly visible at the back of tablet 20 through two apertures 12 and 14, respectively, each formed of mating curved recesses in one edge of each of housing parts 24 and 26. IR emitter 52 is used to send codes for controlling appliances such as TV set 214 or video recorder 212 shown in Fig 10. IR receptor 54 is used to receive program guide information for controlling appliances and also used to receive status information from an appliance.

Also included in control tablet 20 is the circuitry to make the tablet functional. This circuitry is represented in Fig 8. Included in this circuitry is a memory 180 which is used for storing program guide information and appliance status information received from IR receptor 54.

Exploded View Of Display And Point Screens -- Fig 4

Fig 4 shows an exploded view of display screen 62 and pointing screen 64. Also shown is a more detailed view of pointing pen 30. Pointing screen 64 is adhered to the top surface of display screen 62 and is transparent and electrically conductive. When conductive tip 38 of pen 30 contacts screen 64, the X/Y position of pen 30 will be determined by an X/Y position sensor circuit 186, shown in Fig 8. If downward-pressure is then applied to pen 30, a switch 36 in the pen will be activated. This activation can be detected by a pen depressed switch detection circuit 192, shown in Fig 8.

Holder -- Fig 3

Fig 3 shows a holder 100 for storing, recharging and programming tablet 20. Holder 100

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has a top or cradle part 124 and a bottom or base part 126. An IR emitter 152 and an IR

receptor 154 are shown partially visible through apertures 112 and 114 respectively, formed

in the vertical back portion of cradle part 124. When tablet 20 is resting in holder 100, IR

emitter 152 and IR receptor 154 mate optically with IR emitter 52 and IR receptor 54,

respectively, for transmitting data between holder 100 and tablet 20. So that tablet 20 may

be recharged while resting in the holder, electrical contacts 142 and 144 are positioned in

the bottom portion of cradle part 124 to align with contacts 42 and 44.

To display updated, current program guide data, the RC device uses a lasercard reader 170,

shown in Fig 9, to receive this data from lasercard 172. Lasercard 172 is preprogrammed by

etching the data on the lasercard's surface with a laser beam. On a weekly basis, a pub-

lisher could compile, manufacture, and distribute on a subscription basis, lasercards that

contain this data. Alternately, new lasercards could be distributed in magazines, such as TV

Guide.

A lasercard reader access slot 128 (Fig 3) is formed of two mating rectangular recesses

along an edge on each of cradle and base parts 124 and 126, respectively. A power cord 132

with an AC adaptor plug 130 is used to supply the power needed to operate holder 100,

preferably at a low DC voltage. Inside holder 100 is a circuit board (not shown) containing

circuitry shown in Fig 9, including a memory 202 for storing program guide information

read from Lasercard 172, discussed previously. Also included in holder 100 is a power

supply, a lasercard reader, a support frame, and all necessary internal fasteners and circuit

interconnections which are not shown but are well known to those skilled in the art.

Lasercard 172 also contains command signal codes for the entire range of appliances which

the RC device is intended to control, e.g. a plurality of makes and models of appliances,

such as TV and VCRs, or a plurality of different appliances, such as coffeemakers and
household lights.

Operation -- Fig 3

Referring to Fig 3, as stated lasercard 172 containing current program guide information,
is inserted through access slot 128 in holder 100 which contains a lasercard reader 170,
shown in Fig 9. There is software present in holder 100 to control the lasercard reader.
Program guide information is then read automatically from lasercard 172 using the laser-
card reader, into a local memory 202, shown in Fig 9. When control tablet 20 is placed in
holder 100, the information read from lasercard 172 will automatically be transferred, via
IR emitter 152 and IR receptor 54 to the memory 180, shown in Fig 8, of control tablet 20.

Included in lasercard 172 is a special guide containing code information for controlling
various appliances that are on the consumer market. This guide contains the information
to allow a user to select, from options displayed on screen 62 shown in Fig 1, which ap-
pliances will be employed. Using data transfer methods previously described, the ap-
propriate codes used to control selected appliances are transferred to tablet 20 and stored
in a non-volatile section of memory 180 shown in Fig 8. This procedure is only necessary
the first time the device is set up for use, or when a new appliance is added to a user's sys-
tem.

RC Device Display & Operation -- Figs 4, 5, 6 & 7

Referring to Fig 4, when tip 38 of pen 30 is in contact with pointing screen membrane 64
on viewing screen 62, a group of crosshair lines 39 will appear on the screen at the point
that the pen tip and the membrane come in contact. This is used to verify to the user that

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the pen is in contact with the screen and to indicate precisely the information on the screen to which the pen is pointing.

To make a selection, one first touches pen tip 38 to pointing screen membrane 64, on viewing screen 62. Next one activates switch 36 in pen 30 by applying downward pressure to pen 30. This causes the selected area of the screen to be activated and a corresponding action to occur.

Available programs and control functions for a given appliance are selected from the options displayed on screen 62. Fig 5 shows a typical spreadsheet style display showing program data arranged by time and channel. Screen control symbols are also displayed. These can be used to find a desired page of information, or section of the spreadsheet. For example the arrows at the bottom and right edges of the display allow one to scroll left or right over the information to display program guides at different times, or up and down to display further channel selections. Making a selection in the area where a particular arrow is displayed selects the indicated direction. A particular day or time can also be instantly displayed by selecting the appropriate box at the bottom of the screen. Finally, a particular mode for controlling a different appliance, or other information to explain to a user how to use the device, can be displayed by selecting the indicated boxes.

For example selecting the section of the screen labeled "TURN DESCRPTN ON", one can cause the display to show movie reviews, episode blurbs, advertisements, and the like. By making a selection in the area where a particular show's title is displayed on the tablet screen, that show will be viewed at the time the show is broadcast. If the show selected is set for a future broadcast, the device would also turn on the appliance at the selected time to remind the user that the selected show is currently being broadcast. If immediately after

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making a show selection the user selects the "TURN RECORD ON" area on the display, the recording appliance will be activated to record selected show at selected time, if the user's system has recording capabilities.

When the device is in the "TV SHOW SELECTION MODE", as indicated at the bottom of Fig 5, the making of a show selection will activate the appliance to display the selected show at the selected time. For example, suppose the current time is 9:00 PM on Friday, Oct. 26th 1986. Selecting the Miami Vice box will cause TV set 214, shown in Fig 10, to change to Channel 4. If however, one selects Starman, TV set 214 will automatically be changed to Channel 6 by the control tablet at 10:00 PM. Similarly, one could select many advance programs, even days ahead, up to the programmed limit of lasercard 172, previewing descriptions when desired. The control tablet will also remember selections watched on a weekly basis and will preprogram itself to correspond to the viewing habits of the user. For example, if regularly at 9:00 on Friday the user watches Miami Vice, the control tablet will notice this viewing habit and automatically change the channel to Miami Vice if the TV is on Friday at 9:00 PM. Of course a user could bypass this feature by merely selecting another program to watch.

While actually viewing and/or listening to a particular program, screen 62 will display more conventional controls for functions such as VOLUME UP, VOLUME DOWN, PREV SONG, NEXT SONG and STOP PLAYER as shown in Fig 7. If transmitting appliances are available, control tablet 20 can receive information from certain of these appliances and display it on screen 62. Referring to Fig 7 for an exemplary screen display, a compact disc player could transmit content and selection descriptions of songs available for display on the tablet.

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To change modes, one would select the "CHANGE MODE" area on screen 62. This would cause the display to show a "SELECT APPLIANCE MODE" menu. A exemplary representation of this menu is shown in Fig 6. This display can have different information then that shown, depending on the configuration of the system. To change the mode to a different appliance, one would select the area on the screen that corresponds to the appliance the user wishes to use.

Since only the available control selections for an appliance will be displayed at any given time, available selections will be simplified and become more obvious. Unused functions that can cause confusion to the user, will not be displayed. Program guide choices and descriptions for an appliance are readily available for display. A user can easily make program guide choices from the selections shown on the display.

The RC device makes controlling an appliance fun and easy. There are no buttons to push or codes to memorize. Vast amounts of information can be instantly displayed and command choices are obvious. Similar appliances are controlled in the same manner. If a user employs a system different then the one they have, the new system would be controlled in the same manner that they would control their system. There is no need to learn how to operate a new remote control. Since program guide information is stored in the RC device, there is no need for the typical printed guide, which can easily be misplaced.

Control Tablet Circuitry -- Fig 8

The internal construction of the control tablet and charger/cardreader will now be described in detail.

Referring to Fig 8, control tablet 20 consists of eight circuit blocks whose functions are as follows:

1. A controller 182 to process the data needed to make the control tablet functional. This circuit would typically be a single chip microcomputer.

2. A memory 180 to store the data to make the control tablet functional. This memory is connected to controller 182 and is divided into three groups as follows:

A. An Electrically Erasable Programable Read Only Memory (EEPROM) is a permanent, but alterable memory for storing configuration information. Alternatively, one could use a battery back up Read And write Memory (RAM), often imprecisely called a Random Access Memory.

B. A Programmed Read Only Memory (PROM) is used to store the microcode instructions that controller 182 uses to process the data.

C. A data RAM is used for storing program guide data and as a scratchpad memory for controller 182.

3. A screen driver 184 is connected to controller 182 and consists of circuitry needed to activate viewing screen 62 so that program guide information and appliance control selections can be viewed.

4. A pointer position sensor circuit 186 is connected to controller 182 and is used to translate the X/Y position of pen 30 into a form that the controller 182 can process. This cir-

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cuit will apply a voltage across position screen membrane 64 alternating across the horizontal plane, then vertical plane. Pen tip 38, when in contact with membrane 64, will detect a voltage drop that corresponds to the pen position on the membrane. Circuit 186 will then translate the detected voltage into an actual position that the controller 182 can understand.

5.: A circuit 188 detects data at IR receptor 54 so that controller 182 can process the received information from external devices. This circuit consists of a voltage comparator that detects a voltage from the IR receptor when it is activated.

6. A circuit 190 enables controller 182 to drive IR emitter 52 to transmit information to external devices. This circuit consists of a transistor that drives IR emitter when activated.

7. A circuit 192 enables controller 182 to detect activation of position pen switch 192.

8. Hardware to supply power to control tablet 20. This consists of a rechargable battery, a battery compartment 40, and a pair of battery recharger pads, 42 and 44.

Circuitry also includes all of the interconnections between above mentioned circuits to make the tablet functional.

Holder Circuit -- Fig 9

Fig 9 shows circuitry for holder 100. It consists of five circuit blocks whose functions are as follows:

1. A controller 200 to process the data needed to make the holder functional. This controller would typically be a single chip microcomputer.

2. A memory 202 to store the data to make the holder functional. This memory is divided into two groups as follows:

    A. A PROM is used to store the microcode instructions that controller 200 uses to process the data.

    B. A data RAM is used for storing program guide data and scratchpad memory for controller 200.

3. A circuit 206 detects data present at IR receptor 154 so that controller 200 can process information received from external devices. This circuit consists of a voltage comparator that detects a voltage from the IR receptor when it is activated.

4. A circuit 208 used so that controller 200 can drive IR emitter 152 to transmit information to external devices. This circuit consists of a transistor that drives IR emitter when activated.

5. A circuit 204 that enables controller 200 to access the program guide information stored on lasercard 172. This circuit consists of an integrated circuit the manufacturer of the lasercard reader supplies for interfacing lasercard readers to controllers.

6. A power supply 148 to supply power to holder 100. This includes power cord 132 and plug 130 for connection to external power source. Also included are a pair of recharger

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pads 142 and 144 to recharge control tablet 20.

Configuration Of The System -- Fig 10

The configuration or layout for a typical complete video system consisting of a TV, VCR, etc. is shown in Fig 10. Control tablet 20 and holder 100 can be mated and separated. As stated, the program guide information is read by the holder by the lasercard reader. In this configuration holder 100 is a stand alone unit which is not directly connected to the system. In this configuration decoded video signal output from a video cable/satellite/antenna channel # selector is input into video recorder 212. The video signal from video recorder 212 is supplied to TV set 214. Control tablet 20 sends codes that control the channel selector, video recorder, and TV set, and receives program guide information from holder 100.

Alternative Configuration Of The System -- Fig 11

Fig 11 illustrates a typical video equipment cable interconnection with control tablet 20 and holder 100 where the program guide information is downloaded from video cable/satellite/antenna channel # selector system 210. Program guide information is encoded and decoded on a selected channel by methods currently used to display text during "Closed Caption" broadcasts for the hearing impaired. Since program guide data is downloaded through a video connection, there is no need for a lasercard or lasercard reader. This configuration has the advantage that if the program guide is changed at the last minute, e.g., for an emergency news flash, the information can be instantly downloaded and updated in the control tablet. Appliance interconnections would be identical to those described in Fig 10, except that holder 100 would be connected so that it would input the

video signal output from channel decoder 210, and the video signal output from the holder

would be the input into video recorder 212.

Alternative Pointing Methods -- Fig 12

The preferred embodiment described above has a screen incorporated in the control tablet.

Other variations are possible. For example as shown in Fig 12, a joystick type control 120

could be employed to move a cursor on a display shown on the viewing appliance. Opera-

tion would proceed as above, except that the user would have to use the joystick and a

pushbutton to move the cursor and make selections rather then the pen method previously

discussed. Selection information would be displayed on the TV set, rather than the display

in the RC device. With this configuration holder 100 has charactor generation circuitry

used to build the screens on the TV set that are normally displayed on tablet 20.

Optional Embodiment Combining Holder & Channel Decoder -- Fig 16

An optional embodiment of the holder of Fig 3 is shown in Fig 16. In this configuration

holder 100 also incorporates channel decoder 210 in its housing. Mounted on the surface of

this holder is a video connector 216, for receiving the undecoded signal and a video con-

nector 218, for supplying the decoded signal to TV set 214. Also incorporated is a channel

indicator 220, this to displays the current channel being decoded.

Control Tablet Flowchart -- Fig 13

A flowchart in Fig 13 represents the main loop of the control tablet program which is

stored in PROM 180. Basically the program loops through the following steps:

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1. Update display to show possible selections.

2. Determine if the pointing device is being used. If the pointing device is not being used, then flag that it is not being used by a return to Step 1.

3. Flag that the pointing device is being used. Determine if a selection is being made. If a selection is not being made then return to Step 1.

4. A selection has been made so execute the action that corresponds to the position of the pointing device, then return to Step 1.

The following is a detailed explanation of the blocks in the flowchart. The remaining operations are self-explanatory and will be easily understood by one skilled in the art.

Block 50 (Init) represents a one time initialization step that starts off the flow chart. Here variables are initialized and configuration information is selected.

Block 52 (Display Screen) represents a step, in which the display is updated with information pertinent to the current mode and selection information. It displays the cursor if the pointing device is being used.

Block 54 (In Holder?) represents a decision which the system determines whether the control tablet is in the holder. If it is not in the holder then the system will continue operation at block 58.

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Block 56 (Download Data) represents a step in which program guide information is received by the tablet from the holder. The system then continues operation at block 52.

Block 58 (Pointer Used) represents a decision which the system determines if the pointing device is being used. If the pointing device is being used then the system will continue operation at block 62.

Block 60 (Cursor Off) represents a step that flags the pointing device is not being used so that the cursor will not be shown on the display. The system then continues operation at block 52.

Block 62 (Cursor On) represents a step that flags that the pointing device is being used so that the cursor will be shown on the display.

Block 64 (Is Selection?) represents a decision which the system determines if a selection is being made. If no selection is being made then the system continues at block 52.

Block 66 (Find Position) represents a step that determines the position of the pointing device.

Block 68 (Do Selection) represents a block determines which appropiate action block 70 through 92 will be executed by the position determined in block 68. The system then continues at block 52.

The following blocks, 70 through 92, detail the routines that can be executed from block 68.

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Block 70 (Program Selection) represents a make program selection routine. This routine is called if a selection is made in the spread sheet program guide area of the display. This routine determines on what show the cursor is located and flags that program guide selection to be displayed at the appropiate time. The actual changing of the channel is done in Fig. 14 during a timer interrupt routine.

Block 74 (Change Date) represents a change date to display routine. This routine is called if the pen tip is depressed on the screen above the date bar. The program determines what date that they want to display the guide for and saves it in memory so the next time the screen is displayed the program guide for the selected date is displayed.

Block 76 (Change Time) represents a change time to display routine. This routine is called if the pen tip is depressed on the screen above the change time bar. The program determines what time is selected and saves it in memory so that when the next time the screen is displayed the program guide for the selected time is displayed.

Block 78 (New Window) represents a change the vertical selection window routine. This routine is called if the pen tip is depressed on the screen above the vertical scroll bar which is located directly to the right of the guide display. If there are more channel selections then can be displayed on the screen at one time, the program determines where to center the window by the position of the pen in the bar and saves it in memory so that the next time the screen is displayed it displays the selected channels in the program guide selection area.

Block 80 (Volume Up) represents a send volume up routine. If the pen tip is depressed on

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the screen above the volume up arrow then the control tablet will start sending volume up commands to the TV until the pen tip is let up.

Block 82 (Volume Down) represents a send volume down routine. If the pen tip is depressed on the screen above the volume down arrow then the control tablet will start sending volume down commands to the TV until the pen tip is let up.

Block 84 (Mute Toggle) represents a send mute command routine. If the pen tip is depressed on the screen over the mute icon then the control tablet will send the mute command to the TV. If the TV is already muted the program will send the mute off command.

Block 86 (Help Toggle) represents a toggle help mode routine. If the pen is depressed on the screen above the help icon then the control tablet toggle will turn on the help feature if the help feature is off and turn it off, if on.

Block 88 (Record On) represents a record mode routine. If the pen is depressed on the screen above the record icon then the video recorder will be flagged to record the program selection.

Block 90 (Description Toggle) represents a toggle program description mode routine. If the pen is depressed on the screen above the description icon then the control tablet will toggle the description mode flag. If the flag is on when a guide selection is selected then a detailed description of the selected program will be displayed on the screen. If the flag is off then the tablet would not display that information.

Block 92 (Appliance Selection) represents a go to appliance selection menu routine. If the

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pen tip is depressed on the screen above the go to appliance menu icon, then this causes the mode of the tablet to be changed so that a menu will be displayed. You could then choose another appliance, i.e. compact disk player, etc...

Background Program Task Flowchart -- Fig 14

A flowchart in Fig 14 represents the background program task, stored in PROM 180, that is executed during a timer interrupt. This routine is run on a regular basis and does all the switching of the TV, VCR, etc. The steps that happen during that interrupt are described as follows:

Block 100 (Adjust Time) represents a routine that adjusts for the time of day by increment-ing the time variables.

Block 102 (Is Channel Set) represents a decision that determines if the channel being watched for the current time is the channel desired. If so then the program continues at block 106.

Block 104 (Change Channel) represents a routine that actually changes the channel.

Block 106 (Should VCR Be Recording) represents a decision that determines if the VCR should be recording and is not. If the VCR is recording then the program continues at block 110.

Block 108 (Turn VCR On) represents a routine that turns on the VCR and starts it record-ing.

Block 110 (Data At Receptor) represents a decision that determines if data is present at the IR receptor. If no data is present then the program continues at block 114.

Block 112 (Store Data and Take Any Necessary Action) represents a routine that stores the data received at the IR receptor. The program will then take an appropiate action to flag the main program that data was received.

Block 114 (Return From Interupt) represents a routine that restores the program environment, then returns control back to the main loop program.

Holder Flowchart -- Fig 15

The flowchart in Fig 15 represents the program loop, stored in PROM 202, running in holder 100. It is a simple program whose description is as follows.

Block 150 (Init) represents a one time initialization routine. Here variables are initialized and the program environment created.

Block 152 (Lasercard Present) represents a decision that determines if a lasercard has just been inserted into the lasercard reader. If no lasercard is present then the program continues at block 156.

Block 154 (Read Lasercard) represents a routine that reads in the necessary information off the card and stores it in the holder's internal memory.

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Block 156 (Tablet In Holder) represents a decision that determines if the control tablet is positioned in the holder. If the tablet is not in the holder the program returns to block 152.

Block 158 (Download Data) represents a routine that downloads program data stored in the holders memory to the tablet. The program then returns to block 152.

Summary, Ramifications, & Scope -- Control Tablet

As previously described, the RC device basically incorporates a TV guide, a screen for displaying the TV guide, and a pointing device for making selections from such guide. Images composed of words for descriptions and symbols for representing commands can be displayed on the screen. Commands are grouped in sets which are not all shown at once. Each set, or menu, contains a group of commands appropriate for a selected appliance. Also included in each group are commands for changing from menu to menu. Symbols as well as command descriptions can be used to represent commands, and can be tailored to suit the individual user. For example if the device were to be in the command mode for adjusting a graphic equalizer for an audio system, the screen may display the current settings in the familiar bargraph form that the user is accustomed to. To change a setting, one would simply select the bar one desires and slide it up or down to the desired position. Only the commands pertinent to a particular mode are displayed at one time, reducing confusion. Detailed descriptions can be displayed to inform the user of the command function. By using the screen in the above described fashion, commands to control similar appliances from different manufacturers are displayed in the same manner. This allows for uniform control of appliances from system to system.

Another feature of the RC device is automatic program selection and recording. Enter-

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tainment programs in a guide are displayed, typically in a spread sheet fashion, as well as with full program content descriptions. To view a show the user need merely select an area on the screen displaying that show's title. Automatically, the necessary commands will be generated and transmitted from the control tablet to the appropriate receiving appliances. The appliances respond in the ordinary manner as when directed by the original pushbutton control.

The RC device is especially useful with cable television selectors. Quite often the channel selected on the cable box is not the actual broadcast channel that you may wish to watch. Often one must use a separate table of broadcast channel numbers to convert to the actual cable channel numbers you wish to select. Since many cable channels, e.g. Showtime, don't have broadcast channel numbers so the cable channel numbers have to be memorized. Using the RC device of the present invention eliminates these problems. When a selection is made for a desired program, the control tablet makes the conversion or selection automatically and issues the correct command.

Since program selections are displayed on the screen of the RC device, a user does not have to have the typical printed version of the printed program guide, which is easily misplaced. A user may need to have this printed version of the program guide in order to operate some RC devices properly. These RC devices do not provide for channel conversions or display of program selections. They also work with VCR's only and are still complicated to use.

Summary, Ramifications, & Scope -- Uses With Recording Appliances

When an appliance has the ability to record video or audio medium, it can be confusing to a user to select a channel, start record time, and stop record time for the recording ap-

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pliance. The present RC device has a simple solution to this problem. One need merely activate the desired selection from the program guide displayed on the viewscreen for a selected appliance. Then the user informs the RC that the user wishes to record that program selection. This is done by activating the "TURN RECORD ON" function selection on the viewscreen. The RC device would then send the appropriate signals to the recording appliance at the appropiate time so that the program selected would be recorded. This would also allow recording of future selections even if the recording appliance does not have the ability to be programmed to record at a future time. In such a case, the RC device would wait until the time selected for the desired program, then start the recording appliance to record from the desired channel. The RC device would then turn off the recording appliance when the program selected is done.

The previously mentioned feature can also be used fix another problem that exists with most programmable recording appliances. That is the ability to record multiple selections at different times. The RC could solve the problem of having to decide which soap opera the user wants to record while at work. The RC would control the recorder so that both shows were recorded properly.

Summary, Ramifications, & Scope -- Holder and Transmitting Appliances

Additionally, appliances with transmitting capabilities can send information to the control tablet. One such appliance is a holder for the control tablet the combines a battery charger and a lasercard reader. Current program information stored on a lasercard and read by the reader when the card is inserted in the reader. This information is transfered by IR transmission to the control tablet.

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A special guide included with the program guide information on the lasercard contains information for possible different configurations of appliances. The control tablet is initialized for the user's particular models of appliances, when the user completes the selections directed by the special guide. This procedure would only be required before the first use of the appliances or control tablet, or when an appliance is changed or added. The special guide information would also be updated, in successive lasercard issues, when necessary for initializing any new appliances which comes to the market.

Other transmitting appliances could send various status information to the tablet such as current channel, elapsed time, etc. Recorded formats loaded into transmitting appliances could send their program content to the tablet for automatic selection in a similar manner as described above. For example, upon insertion of a compact disk into a compact disk player, the song titles and order may be transmitted to the control tablet. The control tablet will memorize this data and display it on the screen when the compact disk mode is selected. One would select the songs titles in the order desired to be listened to and the tablet would then program the compact disk player to play the songs in the order selected.

Summary, Ramifications, & Scope -- Optional Embodiments

While the preferred embodiment employs a lasercard reader in the holder for acquiring guide updates, other methods may be used for receiving program information. For example, one could use a floppy disk reader or download such information over telephone lines or use a transmission channel by either cable or wireless means, including by satellite. Also, numerous means could be used in place of, or in addition to, the infrared laser emitter and receptors shown in the preferred embodiment. These means could be microwave, radio, carrier current or direct wirelink.

It should be noted that the screen does not need be built into the control tablet. It is possible to use the screen on the television to display the guide and selection information. This has disadvantages due to the fact that in order to control an appliance, the user must be in viewing range of a television. The user also must have a television in the first place. Also, if the user is using the television display to show television selection decisions, the displayed information may impede with the television selection currently being viewed.

It may be noted that many different pointing devices could be used instead of a pen. These may include joysticks, lightpens, optical and mechanical mice, and possibly eye position sensors, that register what the eye is looking at.

Finally, other equipment, including telephone accessories, heating and ventilating controls, kitchen appliances and the like, can be controlled by the tablet described above, so long as the equipment has the appropriate receiving apparatus. Having on the tablet screen a plan view of a room, for example, one could represent symbolically each light, appliance, or piece of equipment in that room. Using the pointing pen one could point to a desired temperature on a symbolic thermometer to control heating, turn a light symbol on or off to control a fixture, move the hands of a clock on a coffee pot picture to set the start brewing time, and so on.

The automatic program selector is easy to use and versatile. It vastly reduces confusion, and provides helpful information on demand. Large amounts of information are accessable, numerous control options for a plurality of appliances are available, and the display is in smaller amounts that are more clear and understandable. Selection by the guide in the control tablet eliminates many intervening and frustrating steps, otherwise necessary with

ordinary hand-held remote controls.

While the above description contains many specifities, the reader should not construe these as limitations on the scope of the invention, but merely as exemplifications of preferred embodiments thereof.   For example skilled artisans will readily be able to change the dimensions and shapes of the various embodiments.   They can use many other display devices other then those discussed. They can use many other pointing methods then those discussed. They can use many other methods to receive program guide and appliance status information then those discussed, and they can use many other methods for controlling an appliance then those discussed. Accordingly the reader is requested to determine the scope of the invention by the appended claims and their legal equivalents, and not by the ex-amples given.

Claims

1.   A remote control for enabling a user to control at least one electronic device,
comprising:

a first housing,

a viewing screen in said first housing for symbolically displaying a variety of available
choices for a controllable electronic device,

pointing means in said first housing for selecting one of said choices on said viewing
screen,

means in said first housing for interpreting the selections made and for generating cor-
responding display information and corresponding transmission information for said con-
trollable electronic device, and

.transmitting means in said first housing for sending an appropriate command, repre-
senting the selection made, to said controllable electronic device,

receiving means in said first housing for receiving, from an external source, program
guide information for use with said controllable electronic device,

means for storing and retrieving program guide information, and

means for displaying and selecting said stored and retrieved program guide information.

2. The remote control device of claim 1, further including energy storage means in said
first housing for supplying operation power to subsequent elements in said first housing.

3. The remote control device of claim 1, further including means for charging said energy
storage means.

4. The remote control device of claim 1, further including:

a second housing,

receiving means in said second housing for receiving, from an external source, program guide information for use with said controllable electronic device,

transmission means in said second housing for transmitting said program guide information to said remote control device, and

means for enabling said remote control device to receive and transmit program guide information.

5. The remote control device of claim 4, further including channel selection means in said second housing for use with said controllable electronic device.

6. The remote control device of claim 1, further including:

receiving means in said housing for monitoring changeable conditions transmitted by said controllable electronic device, and

means for displaying the resultant monitored conditions.

7. The remote control device of claim 1 wherein said device contains means for controlling a plurality of said controllable devices by sending the appropriate commands to the desired said controllable device.

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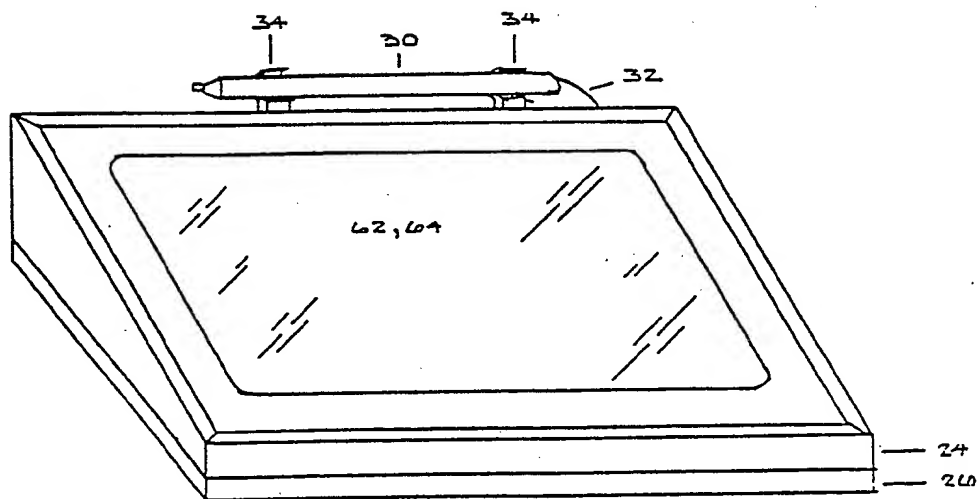
TOP 20

FIG. 1
FRONT & TOP
VIEW OF TABLET

2/7
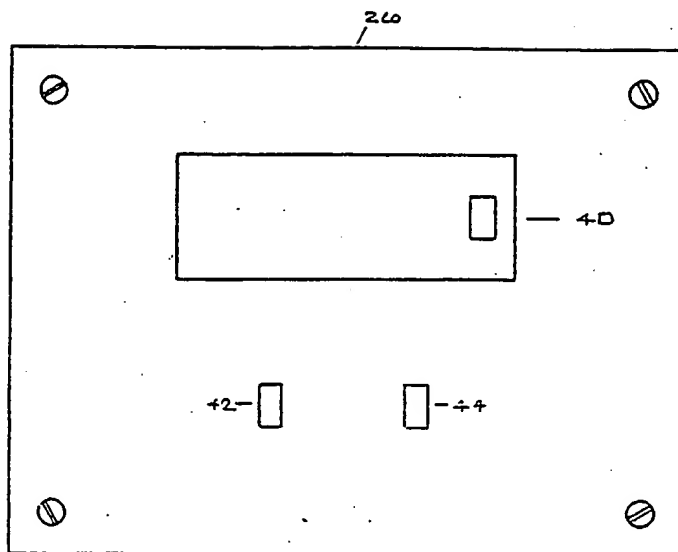
BOTTOM

FIG. 2A
BOTTOM VIEW
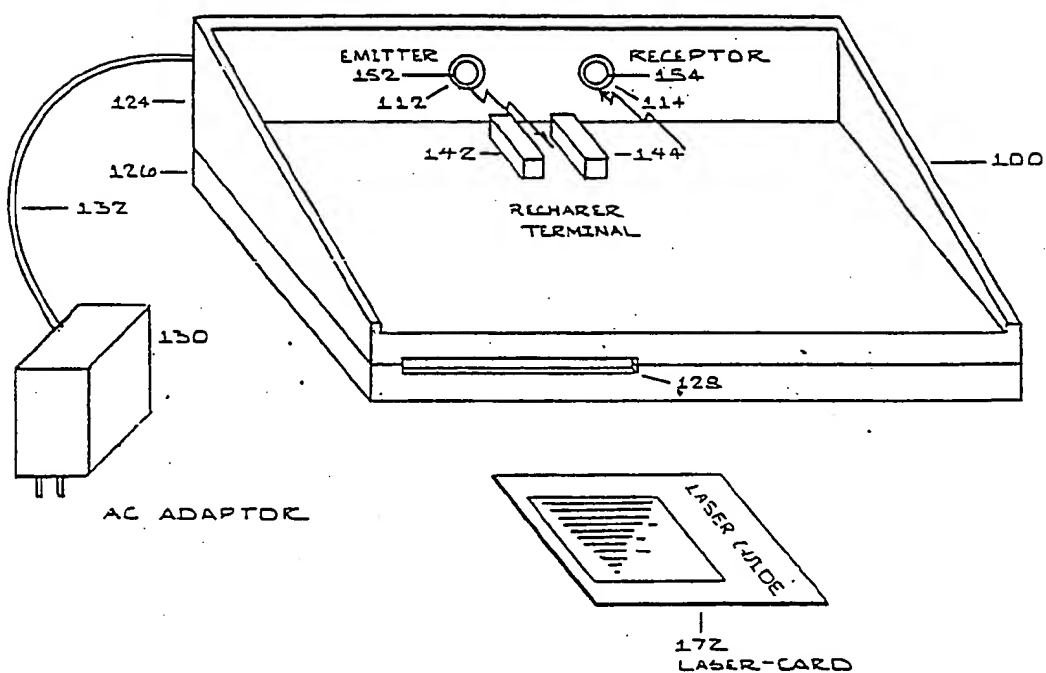OF TABLET

3/7
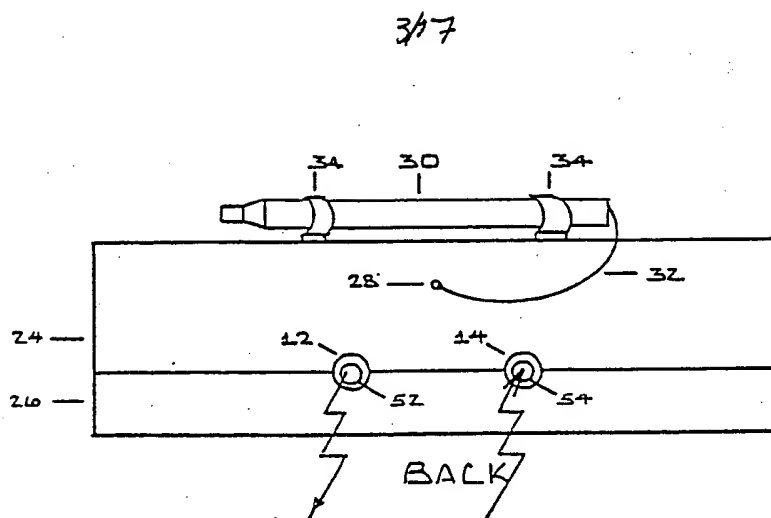
FIG. 2B
BACK VIEW
OF TABLET

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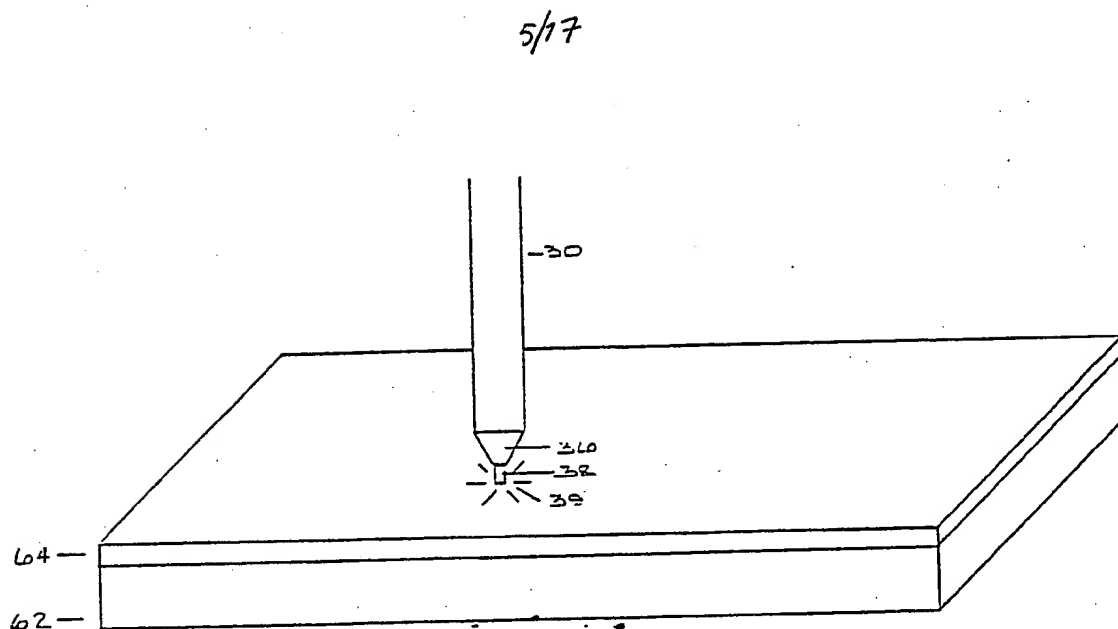EMITTER   RECEPTOR
152   154
112   114

124
126   142   144
132
                    RECHARER
                    TERMINAL
                                                    100

130
                                        128

AC ADAPTOR

LASER DIODE

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LASER-CARD

FIG. 3
CHARGER / CARD READER

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FIG. 4

EXPLODED VIEW
OF DISPLAY AND
POINT SCREEN

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Current : Friday, Oct. 24, 1986 09:00 PM Channel 4 KRON San Fransisco
          Miami Vice

	8:30	9:00	9:30	10:00	10:30	11:00	
2	MOVIE: The Burning Bed '84 ***			News		Late Show	
	Farrah Fawcett, Paul LeMat						
3	A-Team	Miami Vice		LA Law		NEWS	
4	A-Team	Miami Vice		LA Law		NEWS	
5	Great Pumpkin	Dallas		Falcon Crest		NEWS	
6	Wall Street	Great Performances		Hungary		NOVA	
7	Belvedere	Hammer!	Sidekicks	Starman		NEWS	

AM	PM	1	2	3	4	5	6	7	8	9	10	11	12

Sun	Mon	Tues	Weds	Thur	Fri	Sat

TURN HELP ON

TURN RECORD ON

TURN DESCRPTN ON

TURN MUTE ON

UP

DOWN

VOLUME

CHANGE MODE   Current Mode : TV Show Selection

FIG. 5
T.V. APPLIA E
SELECTION SCREEN

Select Appliance Mode

TV Show Selection
Compact Disk Player
VCR

```
TURN
HELP
ON
```

Current Mode : Appliance Selection

FIG. 6
APPLIANCE SELECTION
- MENU

Friday, Mar. 24, 1986 09:00 PM
Current CD : Graceland - Paul Simon

1. The Boy In The Bubble 3:59	7. Under African Skies 3:34	TURN HELP ON
2. Graceland 4:48	8. Homeless 3:45	
3. I Know What I Know 3:13	9. Crazy Love. Vol II 4:17	START SELECTION
4. Gumboots 2:42	10. That Was Your Mother 2:51	
5. Diamonds On The Soles Of Her Shoes 5:34	11. All Around The World 3:15	
6. You Can Call Me Al 4:39		

UP

DOWN

VOLUME

Current Song : The Boy In The Bubble

PREV SONG   NEXT SONG

STOP PLAYER

CHANGE MODE   Current Mode : Compact Disk Selection

COMPACT DISK
APPLIANCE SCREEN

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FIG. 8
CONTROL
TABLET 20

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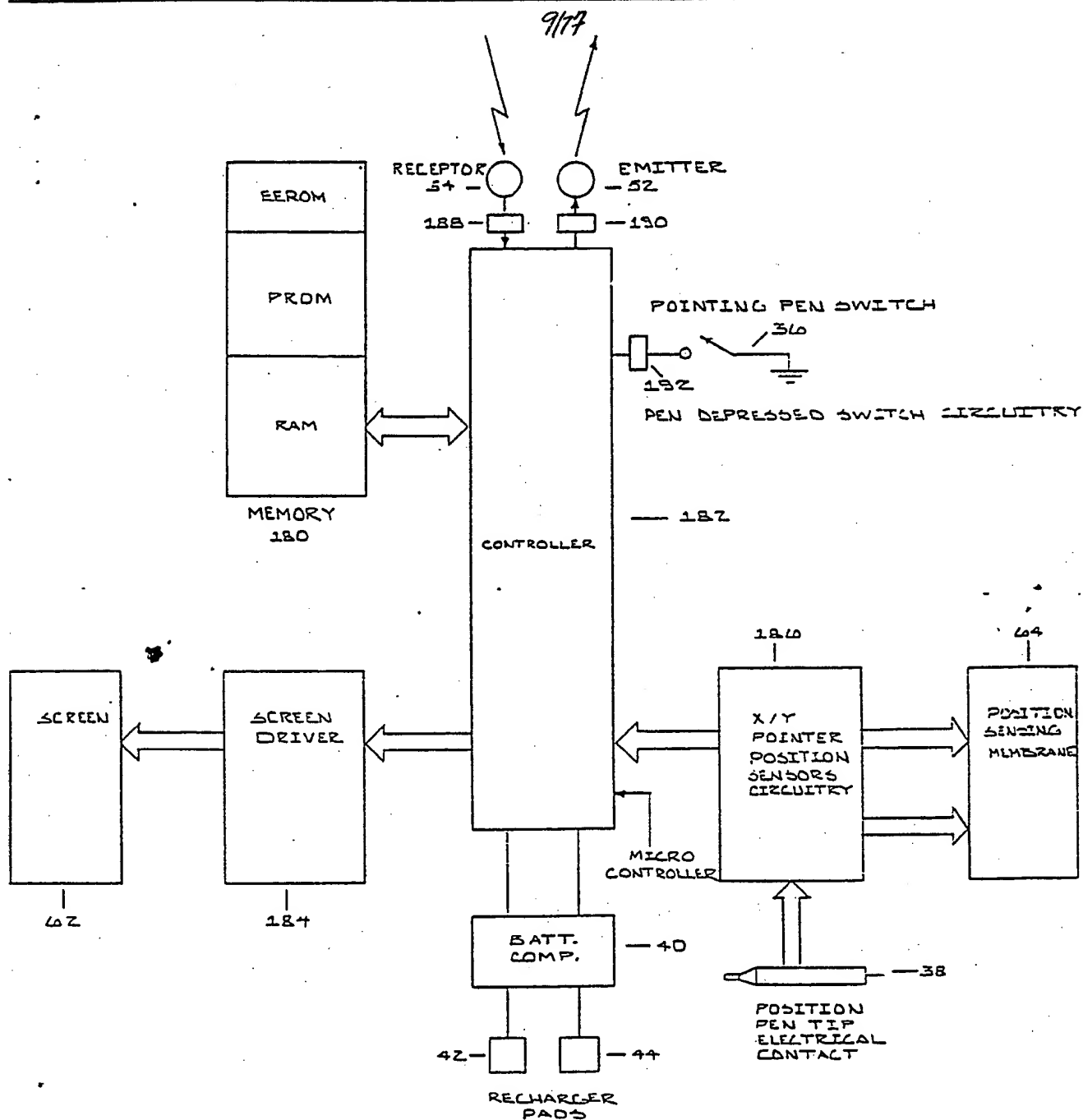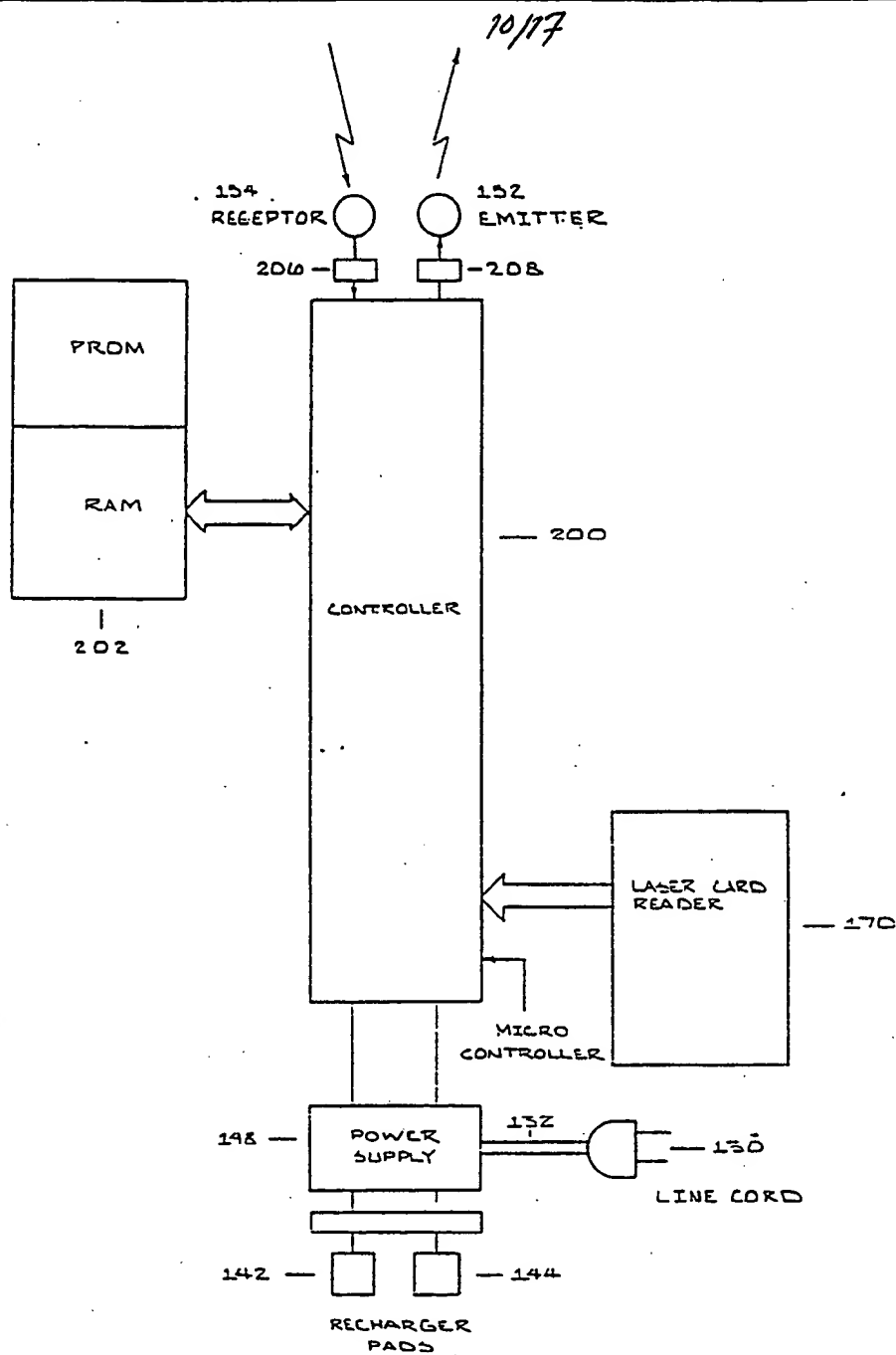
FIG. 9
BLOCK DIAGRAM OF
HOLDER 100

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214

TV SET

20 —

REMOTE

212

VIDEO
RECORDER

100 —

REMOTE CHARGER
WITH GUIDE
READER

210

CABLE/
SATELLITE/
ANTENNA/
SELECTOR
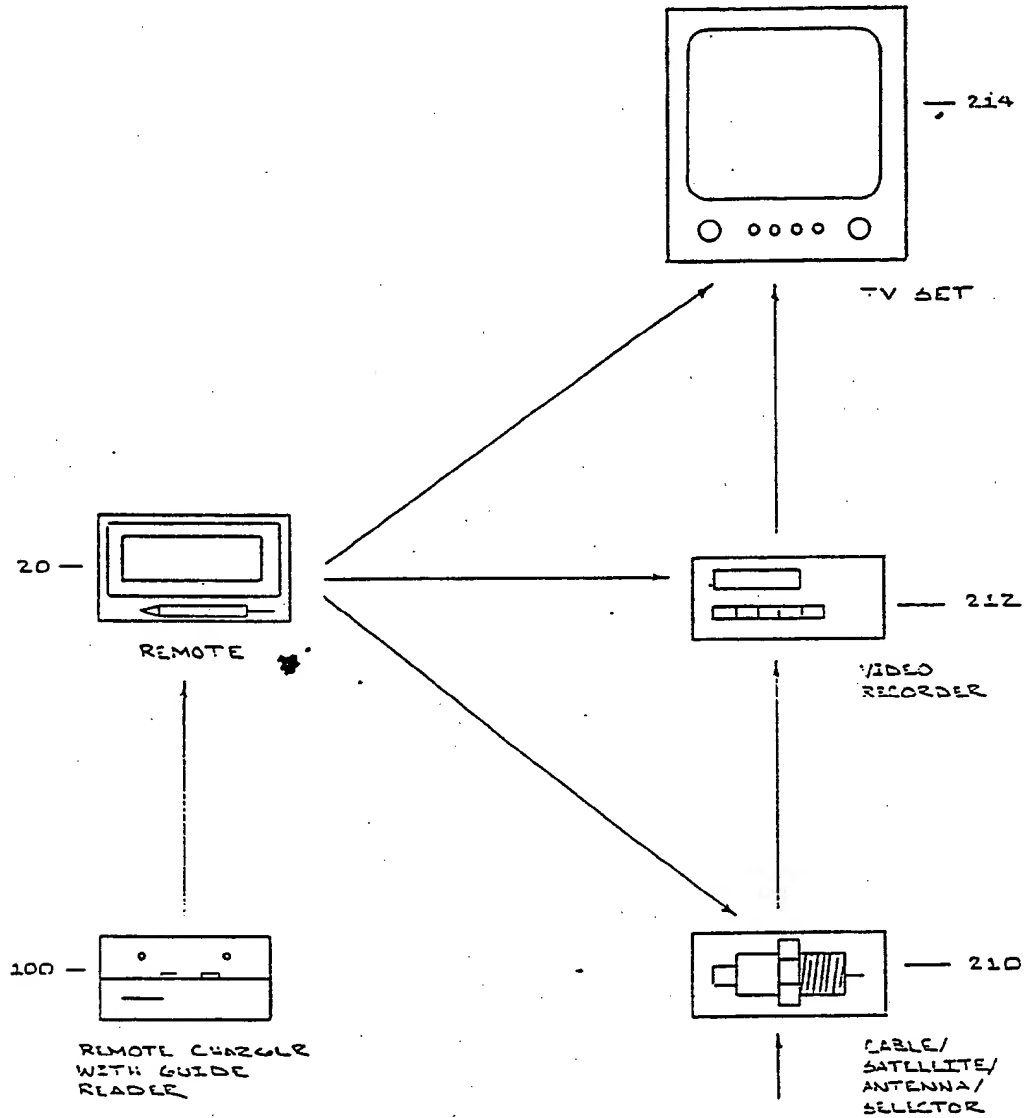
FIG. 10
TYPICAL
CONFIGURATION
OF SYSTEM

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214 — T.V. SET

20 — REMOTE

212 — VIDEO RECORDER

210 — CABLE/ SATELLITE/ ANTENNA/ SELECTOR

100 — REMOTE CHARGER DOWN LOADED PROGRAM DATA

FIG. 11
ALTERNATIVE
CONFIGURATIO
OF SYSTEM

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FIG. 12
ALTERNATIVE
CONFIGURATION
OF SYSTEM

INIT
50

DISPLAY
SCREEN
52

IN
HOLDER
? N / Y
54

DOWNLOADER
DATA
56

PROGRAM
SELECTION
70+72

CHANGE
DATE
74

CHANGE
TIME
76

NEW
WINDOW
78

VOLUME
UP
80

VOLUME
DOWN
82

MUTE
TOGGLE
84

HELP
TOGGLE
86

RECORD
TOGGLE
88

DESCRIPTION
TOGGLE
90

APPLIANCE
SELECTION
92

POINTER
USED
? Y / N
58

CURSOR
OFF
60

CURSOR
ON
62

IS
SELECTION
? Y / N
64

FIND
POSITION
66

DO
SELECTION
68
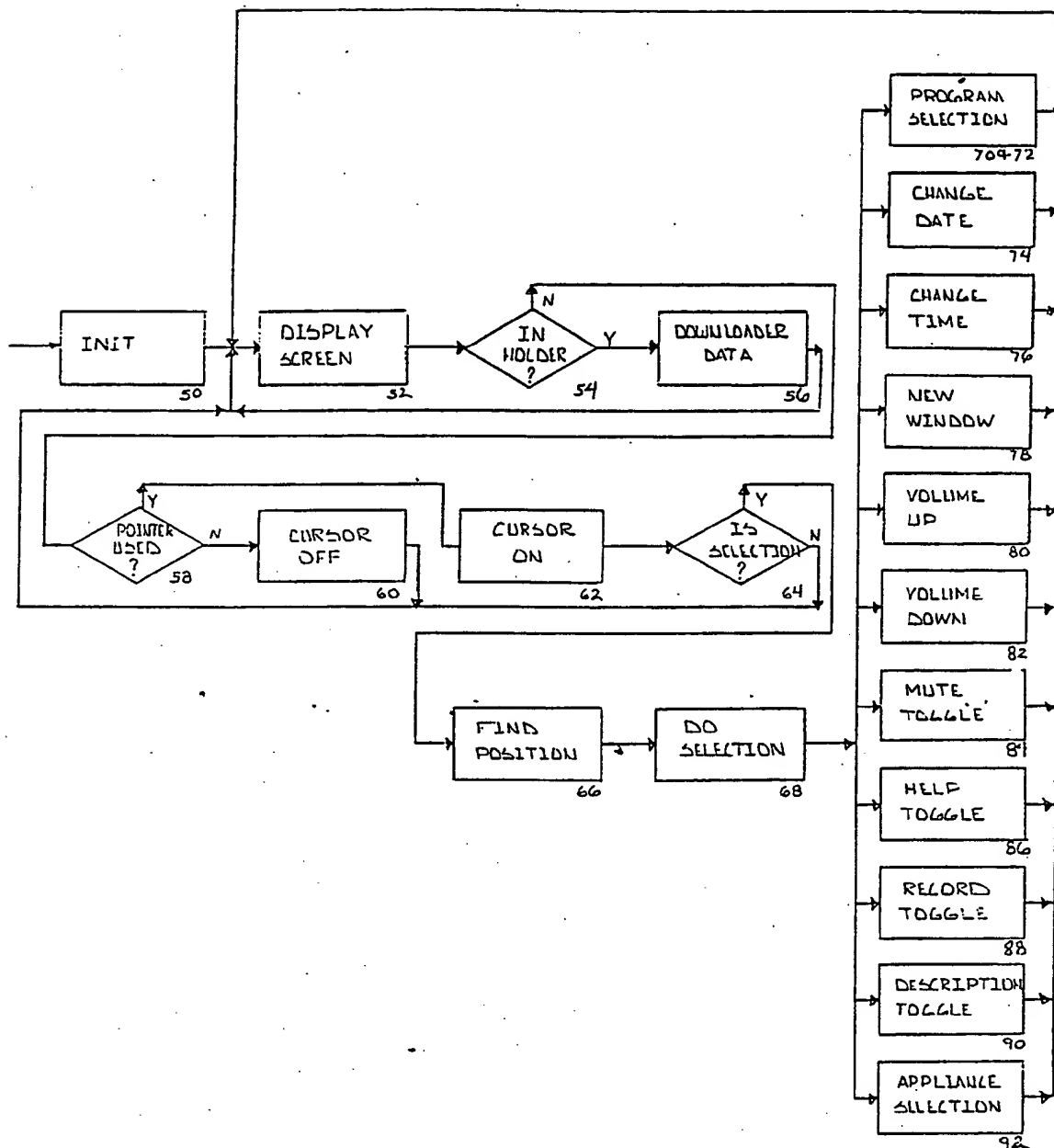
FIG. 13
FLOW CHART TO CONTROL TABLET
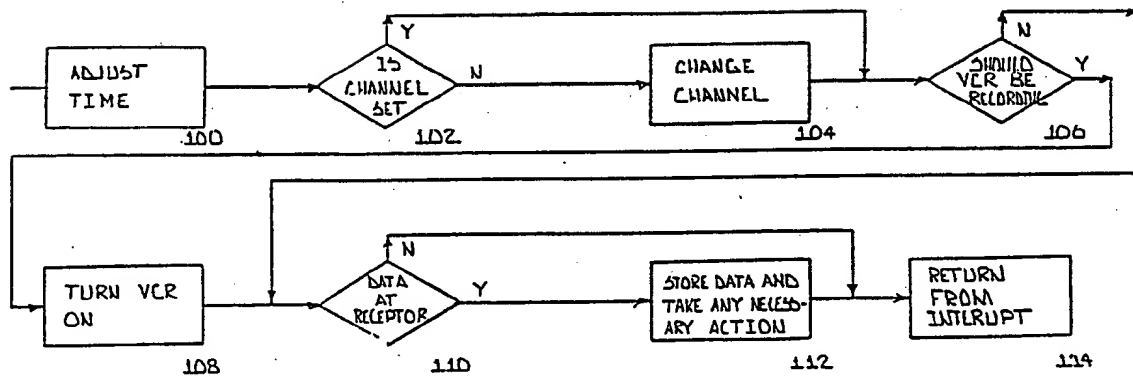
FIG. 14   REAL TIME INTERUPT PROGRAM

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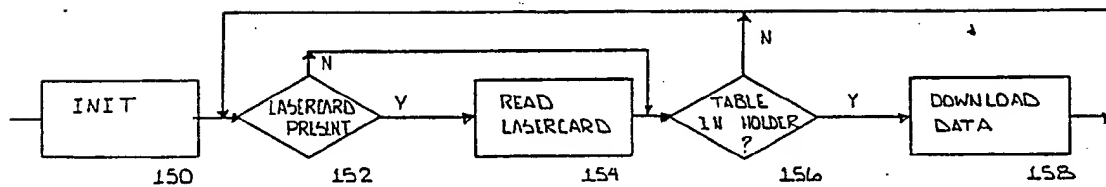
FIG. 15
FLOW CHART FOR HOLDER PROGRAM
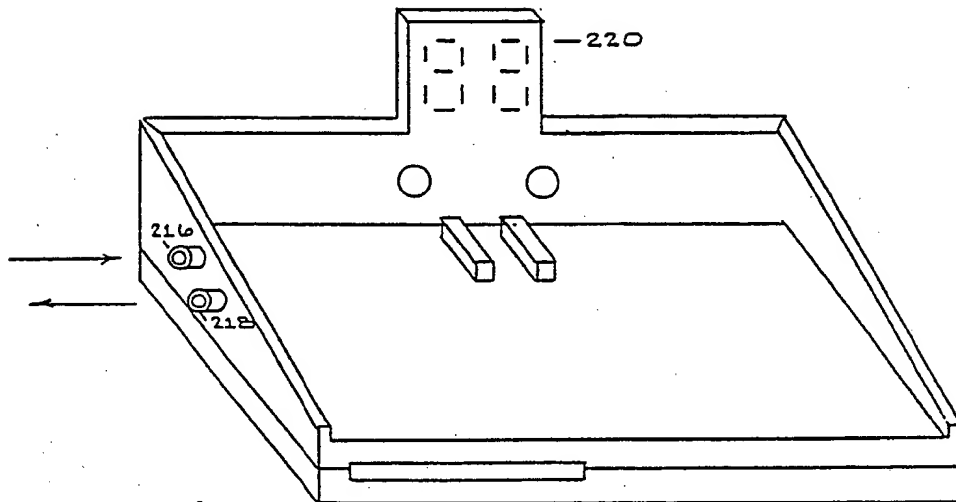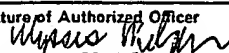
FIG. 16
HOLDER WITH
CHANNEL DECODER

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US88/03344

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) 6

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC(4) G06F 7/04

U.S. Cl. 340/825.06

II. FIELDS SEARCHED

Minimum Documentation Searched 7

Classification System	Classification Symbols
U.S. Cl	358/194.1 340/825.22, 825.06, 825.69, 825.72, 707, 712, 365VL

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched 8

III. DOCUMENTS CONSIDERED TO BE RELEVANT 9

Category *	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13.
Y	US, A 3,956,745 Ellis 11 May 1976 (11.05.76) (Note element 5 can be used with a programmable keyboard 1).. See entire document.	1-7
Y	US, A 4,535,333 Twardowski 13 August 1985 (13.08.85) (Twardowski shows that it is known to have a receiver and transmitter in close proximity; i.e. one on top of the other). See entire document.	1-7
Y	US, A 4,626,848 Ehlers 02 December 1986 (02.12.86) (Ehlers shows a display means, transmitting means, and programmable means). See entire document.	1-7

* Special categories of cited documents: 10

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
30 November 1988 (30.11.88)	0 9 JAN 1989
International Searching Authority	Signature of Authorized Officer
ISA/US	Ulysses Weldon

Form PCT/ISA/210 (second sheet) (Rev.11-87)

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